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## Movie Smoking, Movie Horror, and Urge to Smoke

### Palenie w filmach, horrory i chęć palenia tytoniu

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It is known that exposure to smoking cues increases urge to smoke (UTS), but little is known about other media factors that might also increase UTS. We hypothesized that horror/thriller movies might also increase UTS by increasing negative affect. We surveyed 536 movie patrons who were smokers aged 18 years or older. Subjects had exited 26 movies, of which 12 contained smoking and two were horror films, one with and one without smoking. We used random effects regression to assess the association between exposure to movie smoking, movie horror, both and UTS, controlling for confounding factors. Median age was 26 years and 52% were female. Mean UTS was 5.9, 6.6, 6.6, and 8.7 for smokers exiting movies without smoking, with smoking, horror without smoking and horror with smoking respectively. Smoking in movies was associated with a significantly higher UTS (0.63 [95% CI 0.31-0.94]). Horror with smoking increased UTS by 2.8 points (95% C.I. 2.3, 3.5); the horror without smoking estimate was 0.88, but not statistically significant. This short report offers preliminary evidence that movie horror as one factor besides visual smoking cues that could increase UTS in a community setting.

#### Introduction

Movie watching is a common pastime for people of all ages, so exposures delivered by movies could have large population effects [3]. Smoking in movies has been shown to prompt craving among smokers attending the movie [6], a finding predicted by cue reactivity research [7]. Additionally, movies could prompt smoking in ways that do not involve the presentation of a smoking cue. For example, another trigger for smoking is negative affect [1]. To the extent that movies could lead to transient increases in stress, they could also increase urge to

smoke. Horror/thriller movies are a special class of movie that aims to elicit terror or extreme fear from viewers. We report results from a survey of adult smokers as they were leaving the movie theatre, exploring whether depiction of horror could affect urge to smoke, over and above the depiction of smoking.

Wiadomo, że ekspozycja na palenie tytoniu powoduje wzrost chęci palenia (urge to smoke - UTS), ale niewiele wiadomo o innych czynnikach związanych z mediami, które mogą powodować wzrost UTS. Naszą hipotezą badawczą było, że horrory/dreszczowce mogą powodować wzrost UTS poprzez wzrost negatywnych odczuć. W badaniu wzięło udział 536 widzów palących tytoń w wieku 18 lat i starszych. Badani opuszczali kino po obejrzeniu 26 filmów, z których 12 zawierało sceny z paleniem tytoniu, a 2 były horrorami, jeden z paleniem, a drugi bez palenia tytoniu. W ocenie zależności pomiędzy ekspozycją na palenie w filmie, horror, obu czynników naraz i UTS, także biorąc pod uwagę inne czynniki mogące wpływać zastosowano random effects regression. Mediana dla wieku wynosiła 26 lat, 52% badanej populacji to kobiety. Średnia UTS wynosiła odpowiednio 5,9; 6,6; 6,6 i 8,7 dla osób, które obejrzały film bez scen z paleniem tytoniu, z paleniem, horror bez palenia i horror z paleniem tytoniu. Palenie w filmie było związane ze statystycznie istotnie większym UTS (0,63 [95% CI 0,31-0,94]). Horror, w którym również palono tytoń powodował wzrost UTS o 2,8 punktu (95% CI 2,3; 3,5), po obejrzeniu horroru bez palenia tytoniu UTS wynosiło 0,88 i nie wykazywało różnic statystycznie istotnych. Wyniki tego krótkiego badania wskazują, że horrory są jednym z czynników, obok oglądania palenia tytoniu w filmach, który może powodować wzrost chęci do zapalenia papierosa u widzów kinowych.

#### Methods

Study design, sample, and measures  
 This cross-sectional community-based study took place at a multiplex cinema in Germany. Research assistants were sta-

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tioned outside the theatres and recruited participants as they exited. Participants were asked to complete a short anonymous questionnaire for a "study on movies", for which they entered a lottery for a theatre voucher. Approval was obtained from the Ethical Committee of the Medical Faculty of the University of Kiel. Surveys were completed for 4073 movie patrons over four weeks 8.5% of movie patrons, of whom 585 were smokers  $\geq 18$  years, and 536 had complete data for all study variables.

### Survey measures

We assessed urge to smoke with a single item, "How much do you want to smoke a cigarette now?", with a response scale that ranged from 0-10. Covariates included demographics; level of addiction, determined using the Heaviness of Smoking Index (range 0-6) [5]; and how long before entering the theater the subject had smoked his or her last cigarette.

### Movie characteristics

Subjects had exited 26 movies; research assistants attended each with a timer and clocked the duration of any appearance of smoking on screen. Twelve of the movies contained smoking, modeled with a dichotomous variable indicating the presence vs. absence of smoking.

Two movies from the sample were classified in the genre horror by the Internet Movie Database (<http://www.imdb.com>). "The Strangers" contained 82 seconds of salient smoking (94% of viewers noticed smoking in this movie). In the movie, the female lead (the smoker), and her boyfriend stay at an isolated vacation house and are terrified and attacked by three masked assailants. Smoking is a pretext for boyfriend leaving the house for a short period to purchase cigarettes. While he is away, she smokes and is watched by a masked assailant. The other horror movie, "Mirrors" contained no smoking (4% of viewers thought there were smoking in this movie). In "Mirrors" the lead actor plays a night security cop at an old burned out department store in New York City whose family is threatened by demons locked behind the mirrors in the store. These were the only two movies during the study period that had an adult (FSK 18) rating, an indication that the German rating board viewed both as having extreme levels of violence.

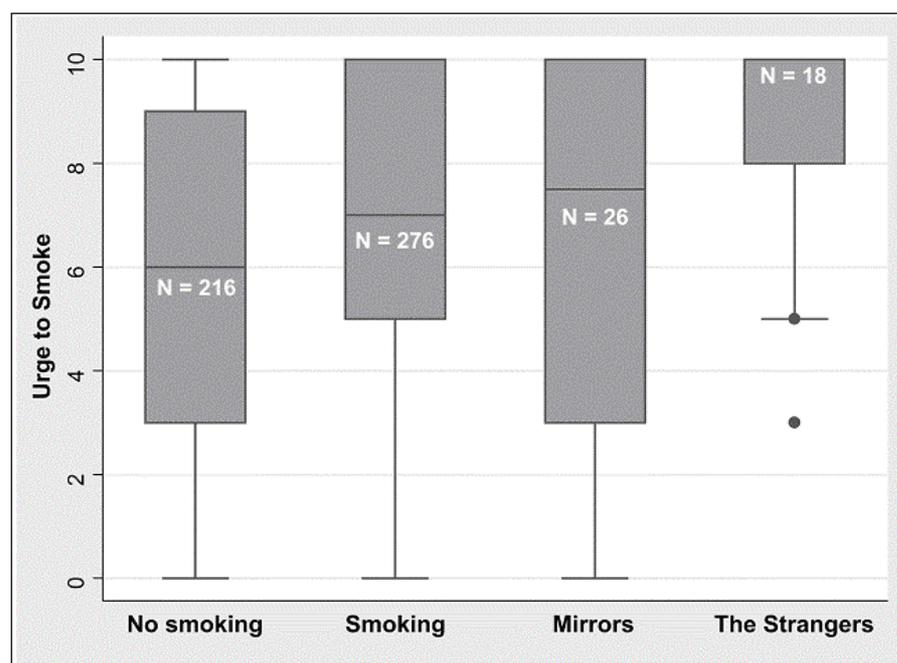
### Theory/calculation

We hypothesized that exposure to smoking cues and movie horror would have an effect on UTS, independent of other movie characteristics, level of addiction, age, gender, and time elapsed since the last cigarette. Because the exposure clustered at the level of movie, urge to smoke was modelled using a random effects regression model using the "xtreg" platform in Stata 9.0 (Stata Corp, College Station, TX, USA), including movie as a random effect in the model to account for individual characteristics that might be associated with movie choice (intraclass correlation for movie was small, 0.014). We entered the following covariates as fixed effects: age (in years),

**Table 1**  
Association between movie smoking, movie horror, both, and urge to smoke.

	N	Beta Coefficient		
		Crude	Adjusted*	95% Confidence Interval
Movie smoking				
None	216	Reference	Reference	
Horror films				
"Mirrors" (no smoking)	26	0,70	0,88	-0,66 2,42
"The Strangers" (smoking)	18	2,79	3,00	1,31 4
Other movies with smoking	276	0,70	0,65	0,04 1,27

\* The random effects GLS regression has movie entered as a random effect, controlled for age, sex, heaviness of smoking index, last cigarette smoked before entering the movie theater, and German movie rating category (FSK-16 and FSK-18)



**Figure 1**  
Urge to smoke for a horror film with no smoking ("Mirrors"), a horror film with smoking ("The Strangers"), all other films without smoking and all other films with smoking. The boxes indicate the median and interquartile ranges for urge to smoke scores.

sex, Heaviness of Smoking Index, time since last smoked, and German movie rating category (using FSK 16/FSK 18 as referent category). Results are reported for unadjusted (crude) and adjusted models, with two-tailed 95% confidence intervals. In order to explore the effects of smoking+horror, vs. smoking, vs. horror, we fit the multivariate model comparing the association between urge to smoke and "The Strangers" (the horror film with smoking), all other movies with smoking, and "The Mirror", compared with all other movies not containing smoking.

### Results

Median age was 26 years, 52% were female. Some 38% smoked less than half a pack per day, 38% smoked between half a pack and 1 pack per day, and 24% smoked more than a pack per day. The Heaviness of Smoking Index score was 2 or below in 60%, indicating that the majority were not heavily addicted to tobacco.

The crude association between movie smoking, movie horror, and both with UTS is shown in Figure 1; mean UTS for exiting smokers was 5.9 (std. dev. = 3.3) for movies without smoking, 6.6 (3.2) for movies with smoking, 6.6 (3.5) for "The Mirrors", and 8.7 (2.1) for "The Strangers."

In the crude analysis (reference category was movies without smoking), the estimates for movie smoking and "The Mirrors" on urge to smoke were identical, but only the movies with smoking category was significantly higher than reference. The effect for "The Strangers" was higher and statistically significant. The general pattern of results did not change in the multivariate analysis (table 1). "The Strangers" was associated with a 2.83 point increase in UTS. Other factors significantly associated with UTS included age (inverse association), the Heaviness of Smoking Index, and time between last cigarette and entrance to the movie theatre. The increase in UTS associated with "The Strangers" was similar to the increase as-

sociated with going from 0 to 4 on the Heaviness of Smoking Index.

### Discussion

This paper explores whether movie characteristics besides smoking cues could influence urge to smoke among smokers in a community setting, providing a provisional test of the hypothesis that horror movies increase urge to smoke. The results suggest that smokers who viewed a horror film without smoking had higher UTS on leaving the movie; however, the result for horror alone is tentative, because the effect was not statistically significant. A second exploratory finding is that exposure to horror plus smoking was associated with significantly higher UTS scores, a pattern that suggests an interaction effect between smoking and horror. The suggestion of an interaction effect is also preliminary because there was just one group exposed to horror plus smoking.

A theory-based explanation of this finding could be that viewing a horror film causes large short-term increases in stress and negative affect, prompting smokers to crave a cigarette. Although addiction theories emphasize negative affect induced by pharmacological withdrawal, there are many studies that confirm that other sources of negative affect can serve as motivators of drug administration or relapse [2,4]. Interestingly, in most addiction models, negative

affect is seen as something the organism seeks to avoid [1]. In contrast, viewers of horror films are attracted to the sensations of stress and fear induced by the film experience, but may have a similar reaction to it as they have to other exogenous stressors, as far as their smoking is concerned.

A final observation is that the film that combined smoking with horror was associated with much higher craving scores. The pattern of results suggests an interaction effect, where combining a visual smoking cue with the stress induced by a horror film has a multiplicative effect on craving.

A strength of this study is that it measured the reactions of smokers to movie cues under naturalistic conditions in real cinemas. It identifies a novel movie characteristic-horror-that could be an important promoter of smoking. However, because there was only one horror film in each category (smoking, non smoking), we cannot be certain that craving response attributed herein to movie smoking is actually caused by horror exposure. Moreover, because this study did not assess the level of stress or negative affect at exit, it is not clear that the increased response to horror is mediated through increased negative affect. Further research involving larger samples of horror/thriller movies, and more extensive exit questionnaires, would be needed address

this limitation. The effect size for viewing "The Strangers", an increase of almost 30 percent on the UTS scale, could be a clinically important increase in urge to smoke, equivalent to an increase of some 5 points on the Heaviness of Smoking Index. We hope the finding will prompt further research on entertainment media effects on urge to smoke.

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